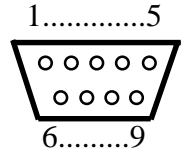


**9 pin "D" RS232**



Note: If the **SLAVE/Master jumper** is installed on the **SPI** board then **JP1** needs to be installed on the **RS232** board. This puts RS232 in Master Mode and SPI in SLAVE.  
**For calibration & diagnostic testing, leave jumpers out.**

Press **RESET** switch on the RS232 board after pressing the **RESET** switch on the **SPI** sensor board.

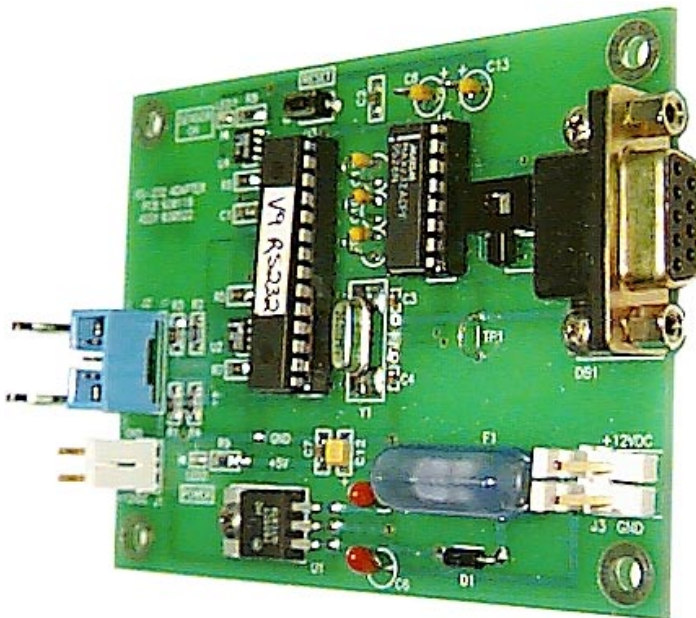
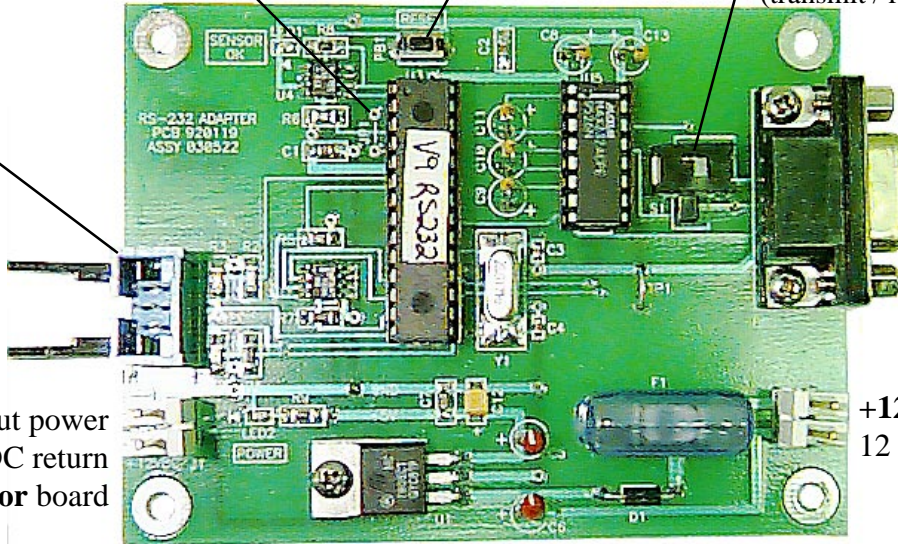
**null modem switch** allows you to reverse pins 2 & 3 (transmit / receive pins)

**SPI** conn. to sensor board. See product spec sheet & **Application Note A59**

9 pin "D" female RS232 conn.  
 pin 2 - transmit  
 pin 3 - receive  
 pin 5 - digital ground

+12 VDC input power  
 12 VDC return to **SPI** sensor board

+12 VDC input power  
 12 VDC return (-)



Any terminal emulation program in DOS like **PCPLUS** or **HyperTerminal** in Windows or in Windows click on "START", click on "Run...", and type "**Terminal.exe**" to communicate over COM Port 1 or 2 using 9600 baud, no parity, 8 bits, 1 stop bit. Switch the null modem switch if Receive / Transmit pins are reversed in the serial cable you are using to connect to the COM Port. If you are communicating with the RS232 board you will get "**LOCKED**" as a message when you press the RESET switch.

Type in capital letters "**VTI**" and you will get "**UNLOCKED**". Type "1" and you will get continuous % gas readings. See **page 2 & Application Note A59** for all commands and responses.

## RS232 Test Board Terminal Emulation Interfaces

For test and troubleshooting you may connect an RS232 test board to the SPI connector as shown on page 1 and the RS232 9 pin D connector (DB9 ) to your computer's **COM port**. A terminal emulation program (VT100 or VT220 type dumb terminal) **HyperTerminal** program that comes with Windows or a program like **PCPLUS** in DOS may be used to talk to the RS232 Test Board. If you have properly configured your terminal program and connected the correct COM port to the RS232 connector you should get a response on your screen of "**LOCKED**" when you press the RESET switch on the RS232 Test Board. Type VTI and it will unlock. This will allow you to type the commands listed below:

| <u>Command</u> | <u>Action</u>   |
|----------------|---|
| <b>1</b>       | DD.DD % <b>gas</b> Continuous   |
| <b>1</b>       | Toggles all calculated values:<br>--- Measurements ---<br>first "1" scrolls % gas <b>0.00 % gas</b><br>data, the next "1" gives <b>3.8818 volts pp</b><br>measurement table to right, <b>27.45 Deg C</b><br>next "1" goes back to scroll ) 0.0010 Atten<br>20.0 <b>RANGE</b><br>0.000 <b>0-1 V out</b><br>3.8855 VZ TC'd<br>1.9708 VSTC'd |

| <u>Command</u>     | <u>Action</u>   |
|--------------------|---|
| <b>VTI</b>         | <b>Unlocks</b> , time out 5 min                         |
| <b>CX DDD.DDDD</b> | Enter Curve Coefficient X =0-7 & value D                |
| <b>STC D.DDDDD</b> | Enter Span Temperature Coefficient D                    |
| <b>ZTC D.DDDDD</b> | Enter Zero Temperature Coefficient D                    |
| <b>STAR DDD.DD</b> | Enter Span Target value D                               |
| <b>VS D.DDDD</b>   | Enter Span voltage D ( measured by SPAN )               |
| <b>VZ D.DDDD</b>   | Enter Zero voltage D ( measured by ZERO )               |
| <b>SETZ</b>        | Perform auto <b>ZERO</b> & store VZ & TZ                |
| <b>SETS</b>        | Perform auto <b>SPAN</b> to <b>STAR</b> & store VS & TS |
| <b>OFF RR.RRRR</b> | Enter new <b>RANGE</b> value (defines 0-1V out)         |
| <b>FILTER D</b>    | Enter new filter value D 1-10 lamp cycles ave           |
| <b>D CCCCCCCC</b>  | Enter <b>serial #</b> (9 alphanumeric characters)       |
| <b>RT</b>          | RESETS the RS232 Test Board                             |
| <b>RS</b>          | <b>RESETS the SPI board</b>                             |

**Note:** All values are stored on EEPROM so they are not lost during power failures.

|          |   |
|----------|---|
| <b>2</b> | Displays all <b>calibration data</b><br>----- <b>Cal</b> -----<br><br><b>VZ</b> 3.8801 Volts (ZERO)<br><b>VS</b> 1.9683 Volts (full scale)<br><b>TZ</b> 28.43 Deg C (zero cal temp)<br><b>TS</b> 28.43 Deg C (span cal temp)<br><b>ZTC</b> -0.005486 V/degC ( ZERO gas temperature coefficient )<br><b>STC</b> 0.002904 V/degC ( STAR SPAN gas temperature coefficient )<br><b>STAR</b> 5.0 % gas ( <b>target calibration gas</b> )<br><b>OFF</b> 20.0000 Volts (no longer used as of Apr 2002 shows <b>RANGE</b> ) |
|----------|---|

**3** Displays all **response curve coefficients:**

|   |
|---|
| ----- <b>Curve</b> -----  |
| <b>CO</b> <b>0.000000</b>   |
| <b>C1</b> 8.438299  |
| <b>C2</b> 33.528999   |
| <b>C3</b> 66.509003   |
| <b>C4</b> 16.270000   |
| <b>C5</b> -24.007000  |
| <b>C6</b> 0.000000 (if coefficient is "0" the term will drop out. |
| <b>C7</b> 0.000000 Hence this is an example of a 5th order.)      |

| <u>Command</u> | <u>Action</u>  |
|----------------|--|
| <b>5</b>       | Change 2%Gas reading & STAR values to 4 decimal places in SLAVE mode only. Press <b>RESET</b> or type <b>RT</b> to reset back to two decimal places. Pertains to 2005 and 2015SPI-1 2% units only. |

**4** Display **Version, Serial Number, and Filter averaging time**

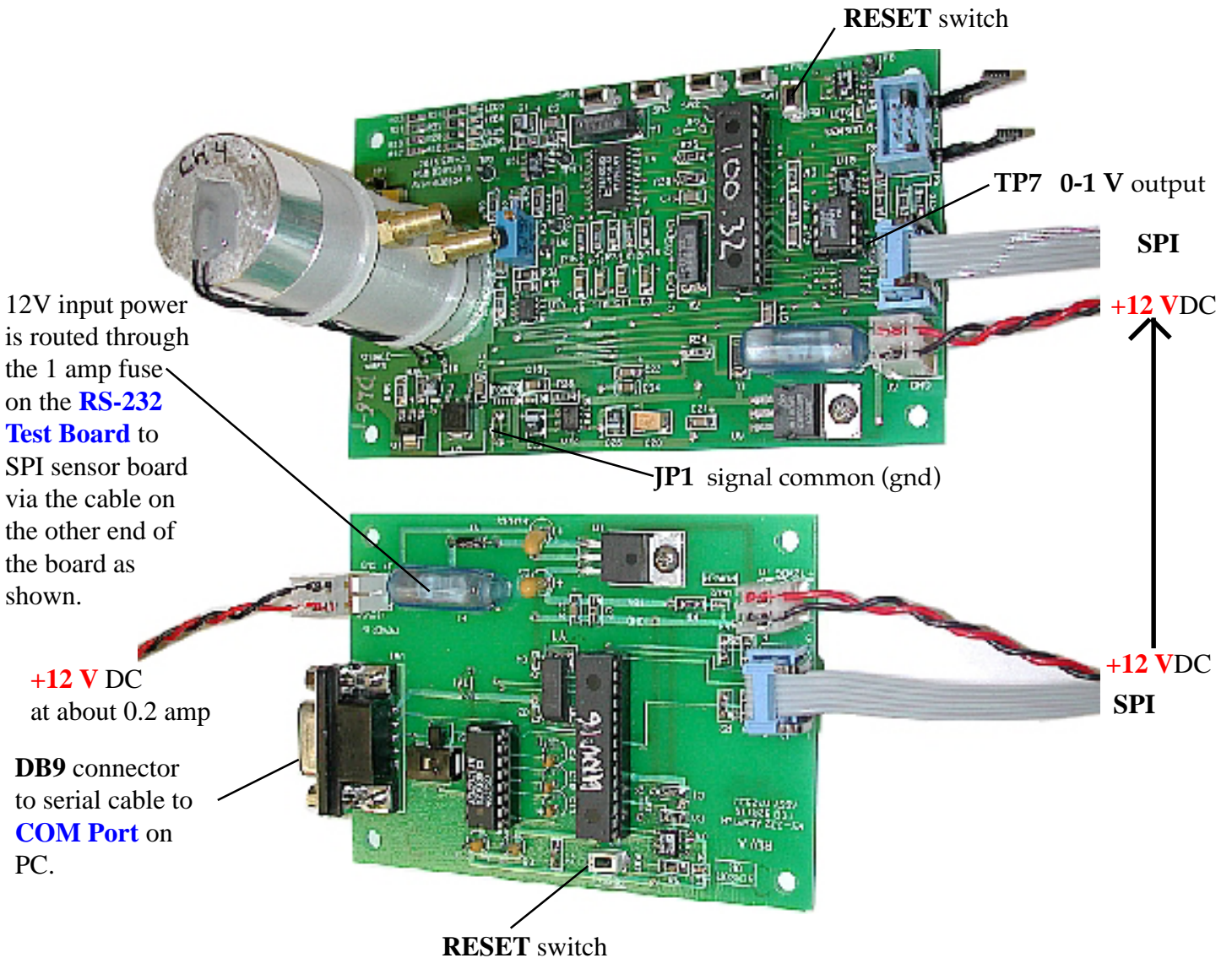
|  |
|--|
| ----- Sys Info -----   |
| <b>UNV.17</b> RS232 Rev (read from e-prom)   |
| <b>20.34</b> SPI Rev (read from e-prom)  |
| <b>DATE</b> <b>02040243</b> (factory calibration date & <b>serial number:</b> April 2002 # 243 ) |
| <b>Filter</b> 15 Secs (variable 1 to 15 seconds, factory set at 15 seconds )                     |

**RS-232 Test Board** shown with a Model **2015SPI-4 100% CH<sub>4</sub>** methane monitor or any **2005SPI-XX** (remote diffusion gas cell) or **2015SPI-XX** (on board flow through gas cell).

Press **RESET** switch on the RS232 board after pressing the **RESET** switch on the **SPI** sensor board.

If you are communicating with the RS232 board you will get “**LOCKED**” as a message using HyperTerminal on your PC. It will take a couple minutes for the sensor board to stabilize after the **RESET** switch is pressed.

Type “**VTI**” to unlock and you will be able to send commands listed on page 2. Type “**1**” and you will get continuous % gas readings. Type “**1**” again and you will get a snap shot of the % gas response followed by the peak to peak voltage out of the preamplifier, the temperature of the detector in °C, the fractional attenuation of this peak to peak signal as compared to **VZ** (stored **ZERO** gas response), the **RANGE** (defines 0-1V full scale), the 0-1 V output for that % gas reading, the temperature compensated **ZERO** gas response, and the temperature compensated full scale response (**VS**) in volts peak to peak. Type “**2**” and you will get all the stored calibration data for this serial #. Type “**3**” and you will get the polynomial curve coefficients that give this serial # its linear response. Type “**4**” and you will get the Version of the Test Board firmware followed by the Version of the sensor board, the serial#, and the (Filter) signal averaging time of 15 seconds. **A print out of all of this calibration data is shipped with each serial numbered sensor.** This data is stored in the **EEPROM** on the board.



12V input power is routed through the 1 amp fuse on the **RS-232 Test Board** to SPI sensor board via the cable on the other end of the board as shown.

**+12 V DC** at about 0.2 amp

**DB9** connector to serial cable to **COM Port** on PC.

**RESET** switch

**RESET** switch

**TP7 0-1 V output**

**SPI**

**+12 VDC**

**JP1** signal common (gnd)

**+12 VDC**

**SPI**